NCCPI

National Commodity Crop Productivity Index

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NCCPI

- A need exists to be able to array soils nationwide on the basis of their inherent productivity
- The National Commodity Crop Productivity Index uses the soil survey database (NASIS) to assess relative soil productivity
- NCCPI is not intended to replace state crop indices
- NCCPI is currently for dryland agriculture

Outline

- NCCPI development process
- Data used by NCCPI
- NCCPI products
- What is next?

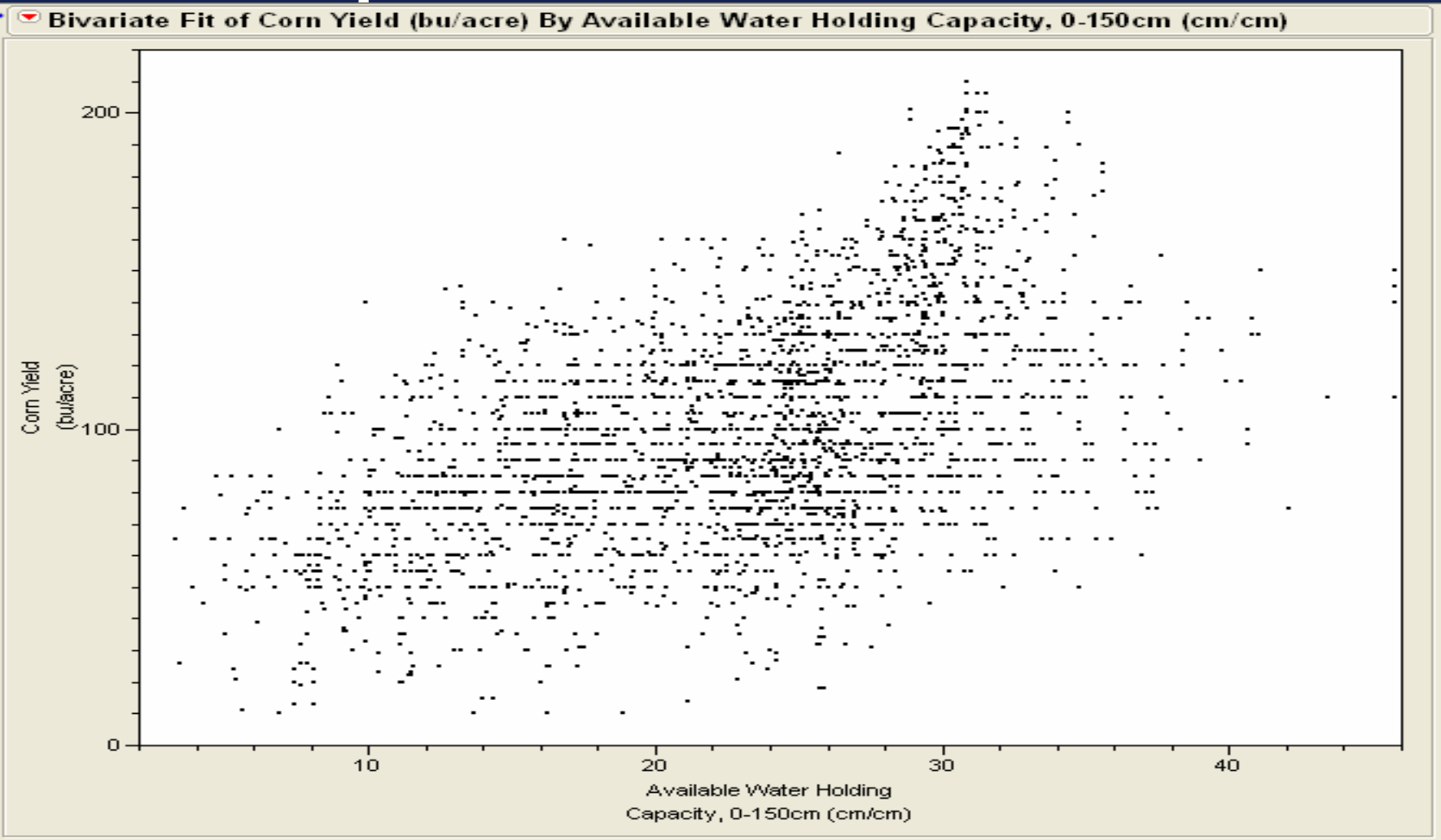
NCCPI Model Development Process

- Select test datasets
- Query for soil properties versus yield
- Plot properties versus yield
- Develop fuzzy sets in NASIS
- Develop rules in NASIS
- Integrate rules
- Test NCCPI versus yield
- Field test, GIS products

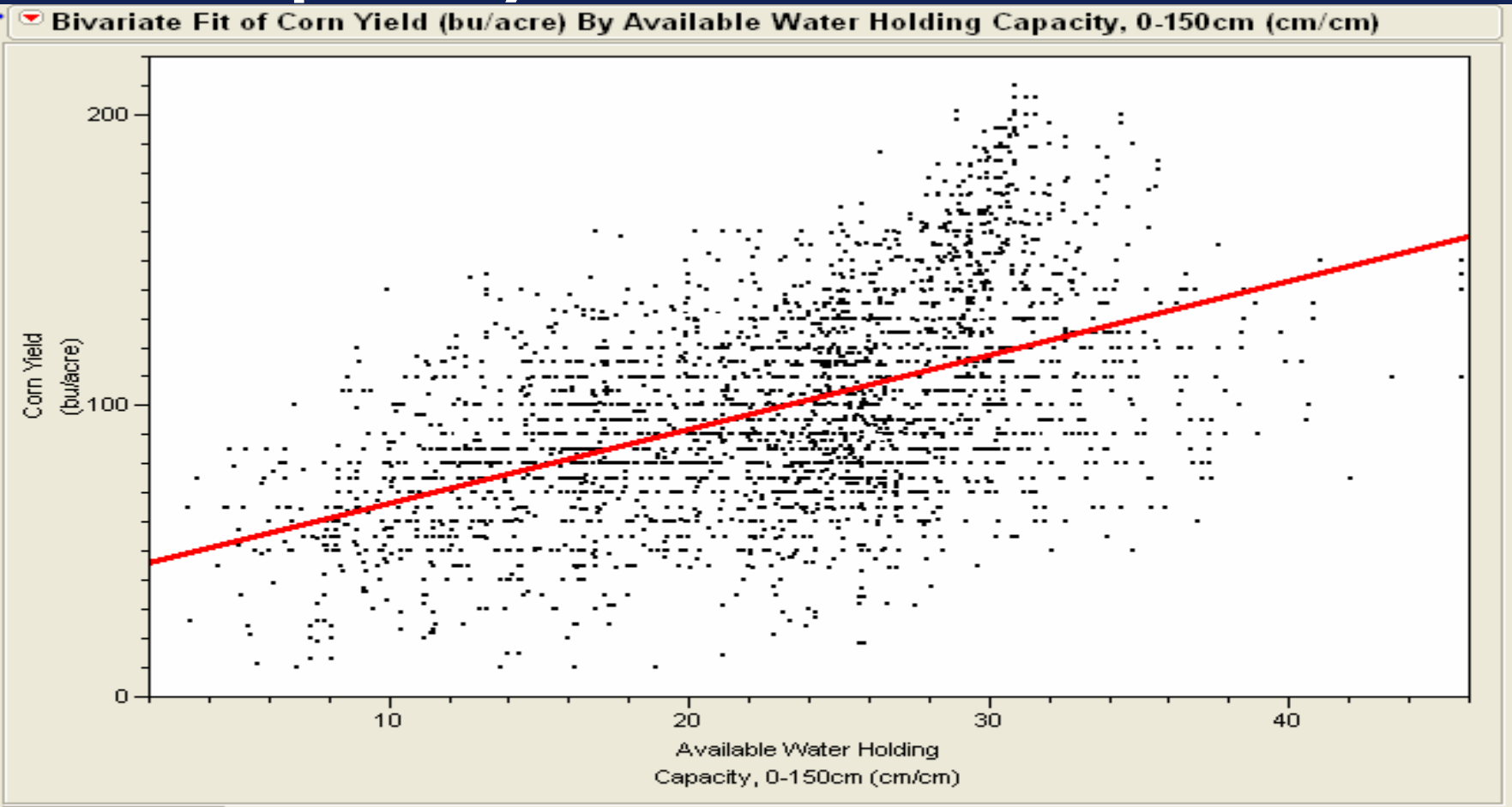
Select test datasets

- Test datasets are selected soil survey areas that represent the geographic domain of where a crop is grown
- At least 100 survey areas per dataset, usually around 10,000 components, usually 1/3 have a yield listed
- Two datasets for each crop

Plot Properties Versus Yield



Develop Fuzzy Sets in NASIS



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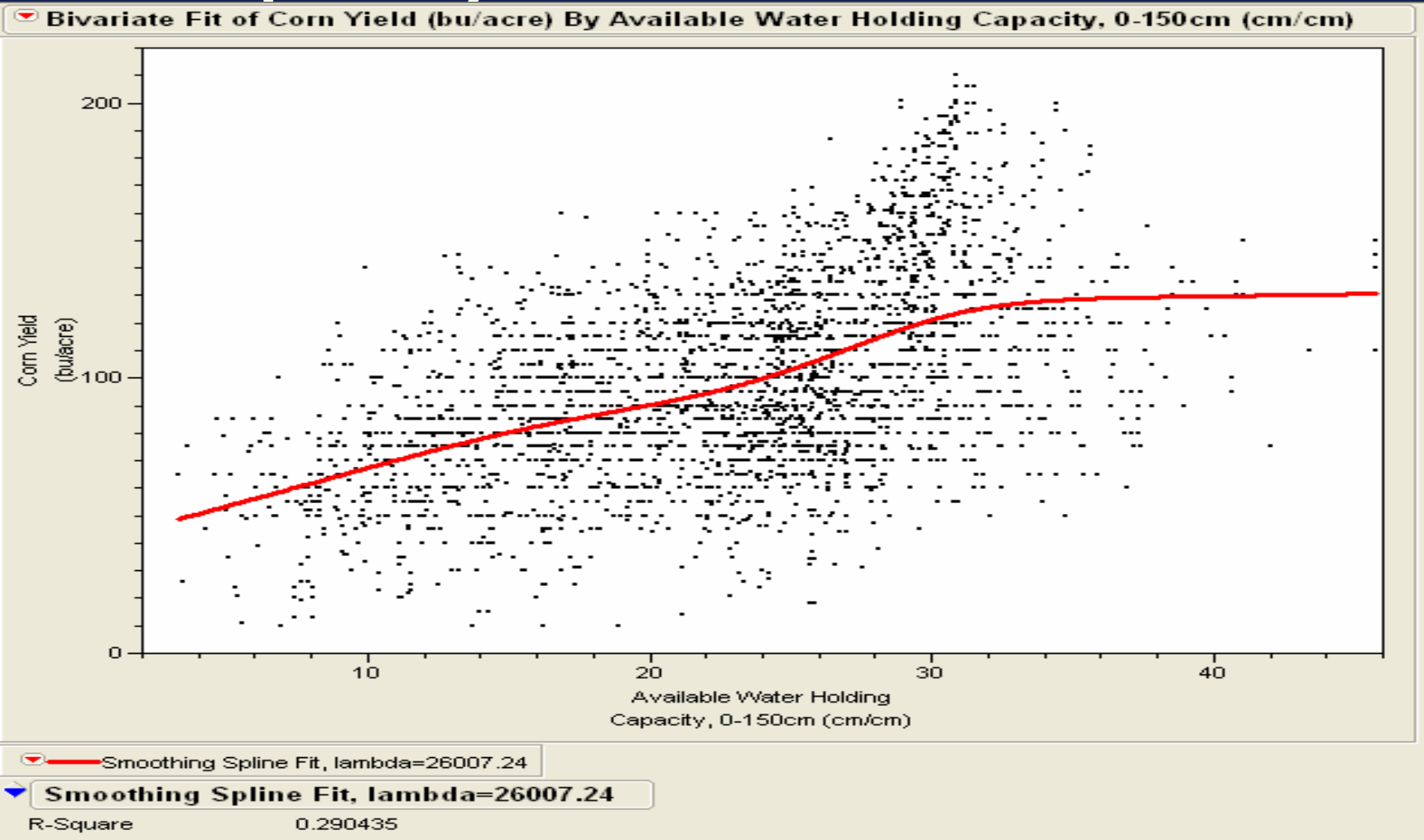
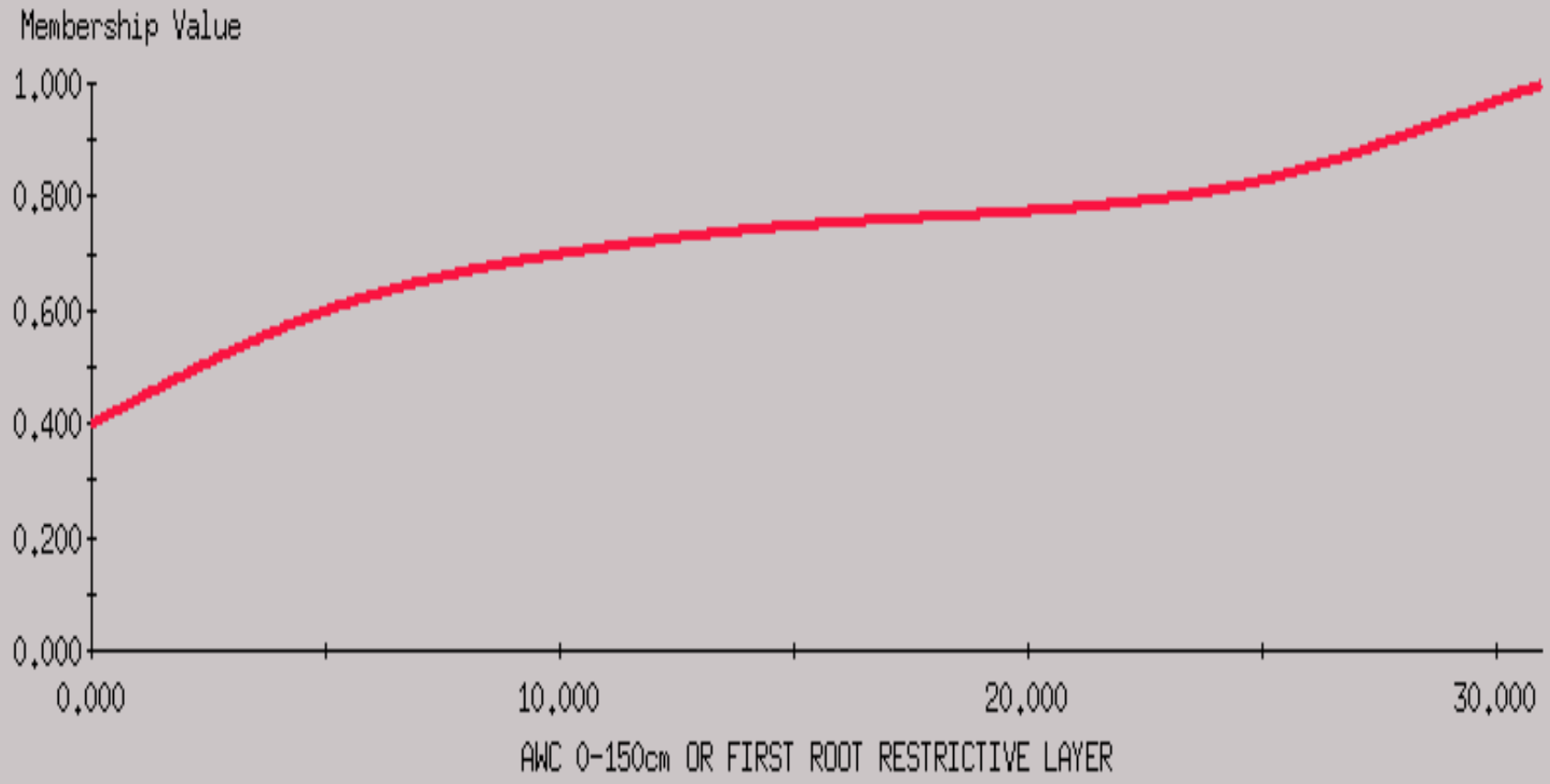
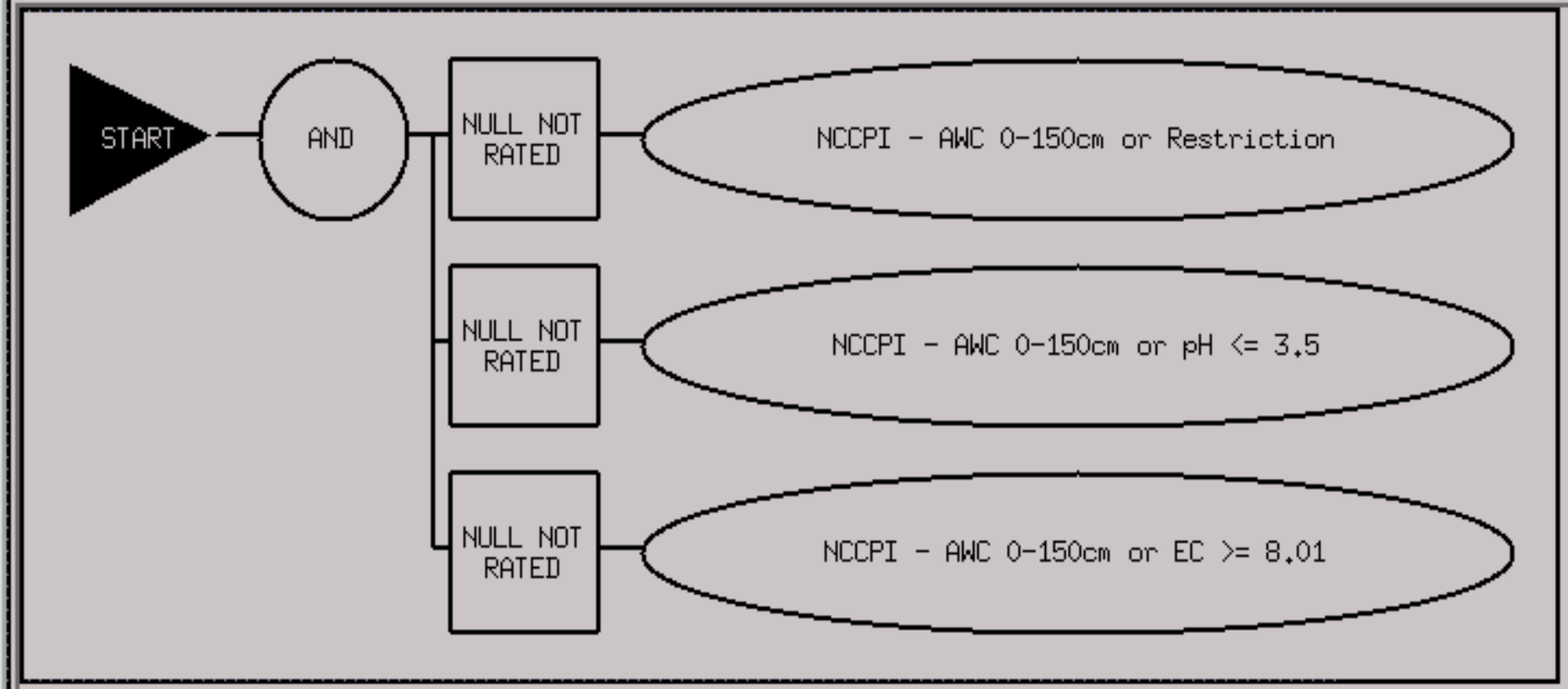


Develop Fuzzy Sets in NASIS

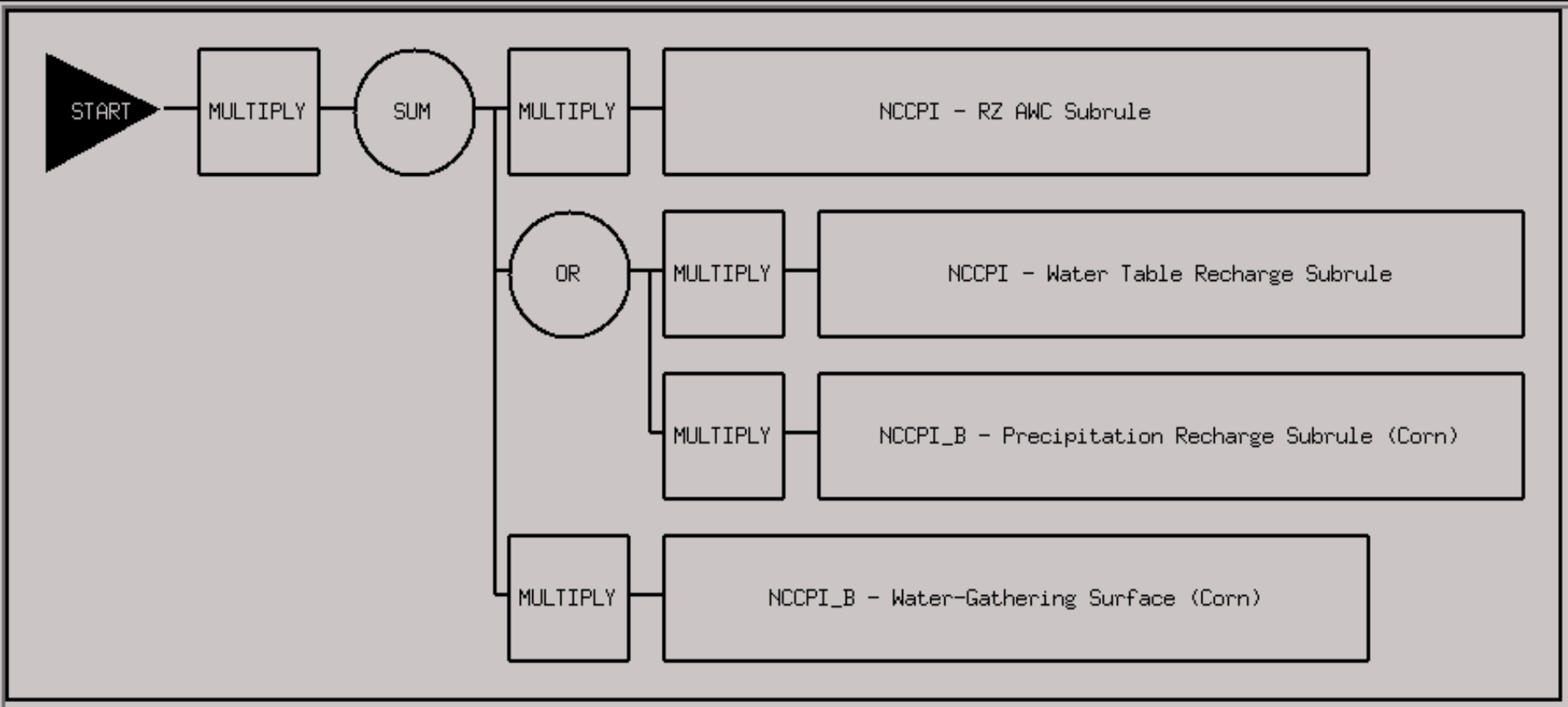


Develop Rules

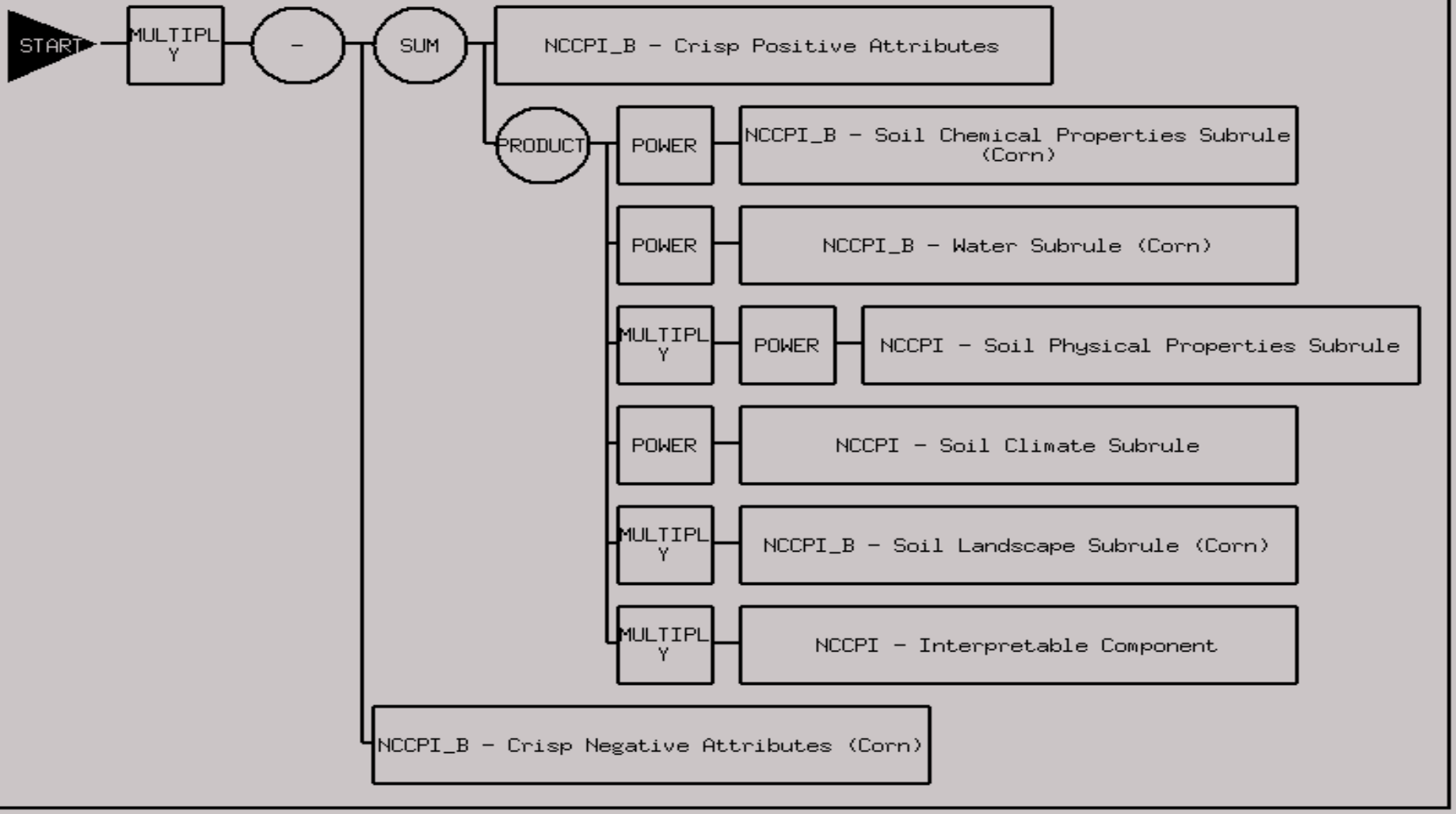


Root Zone AWC Subrule

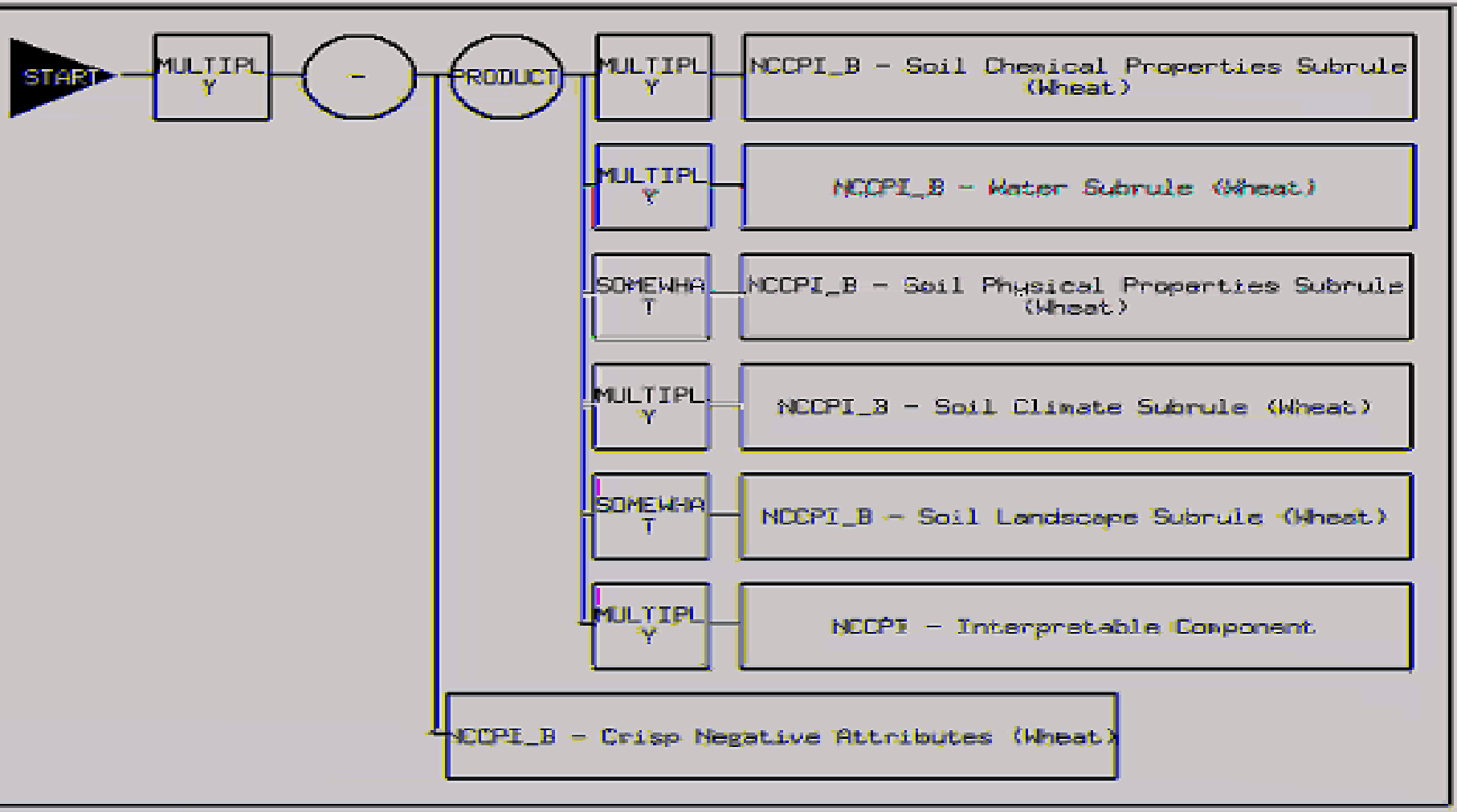
Integrate Rules



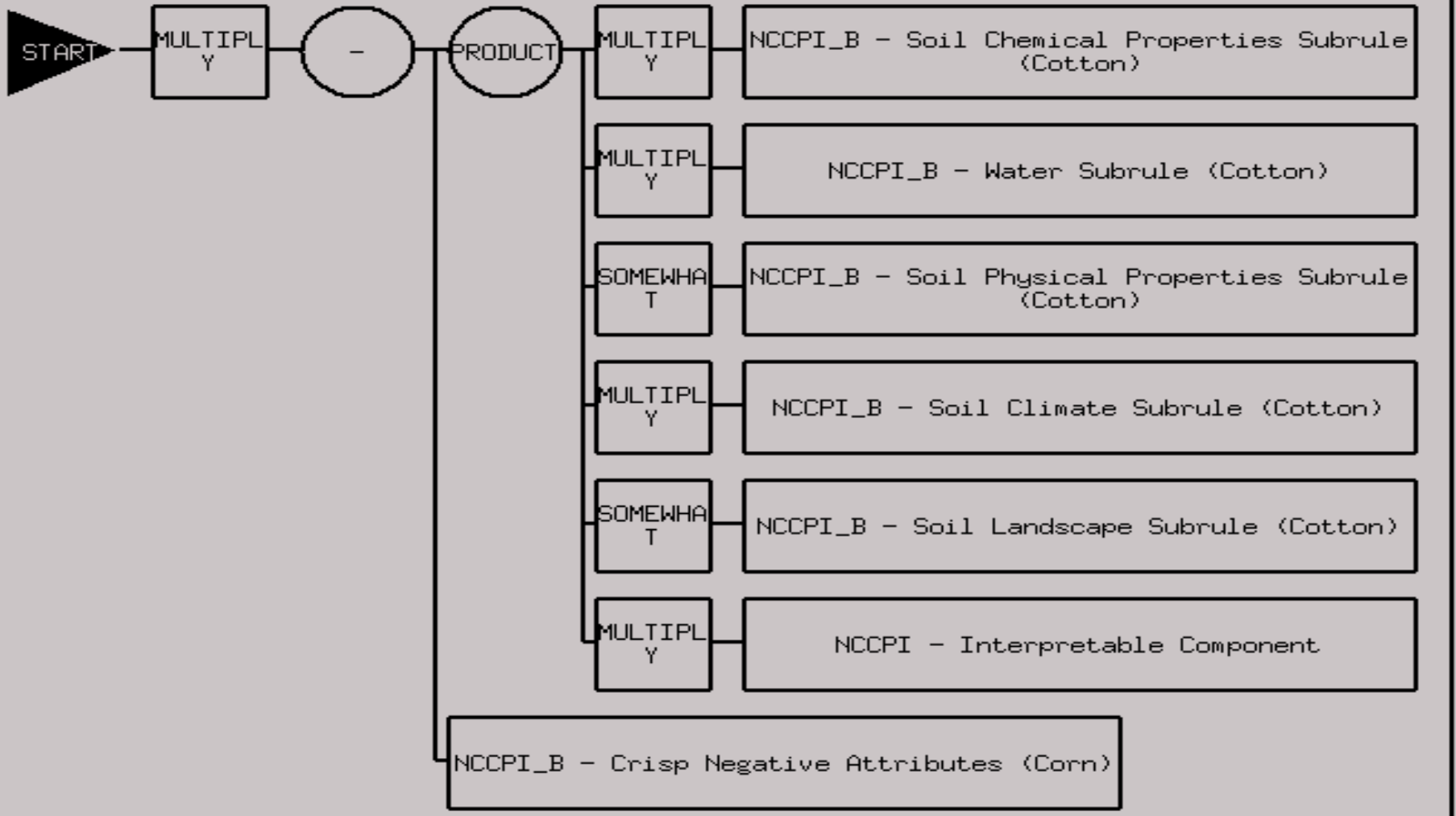
Water Supplying Capability Subrule



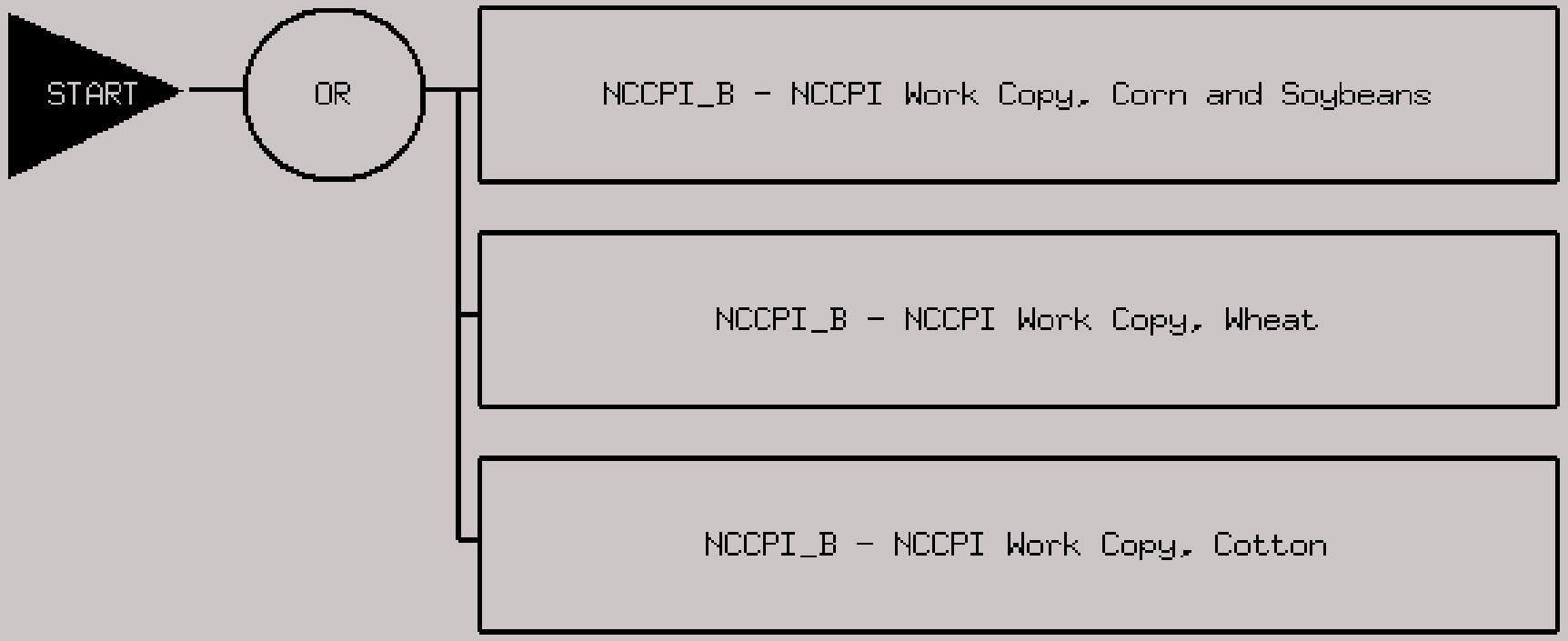
Corn and Soybeans Subrule



Small Grains Subrule

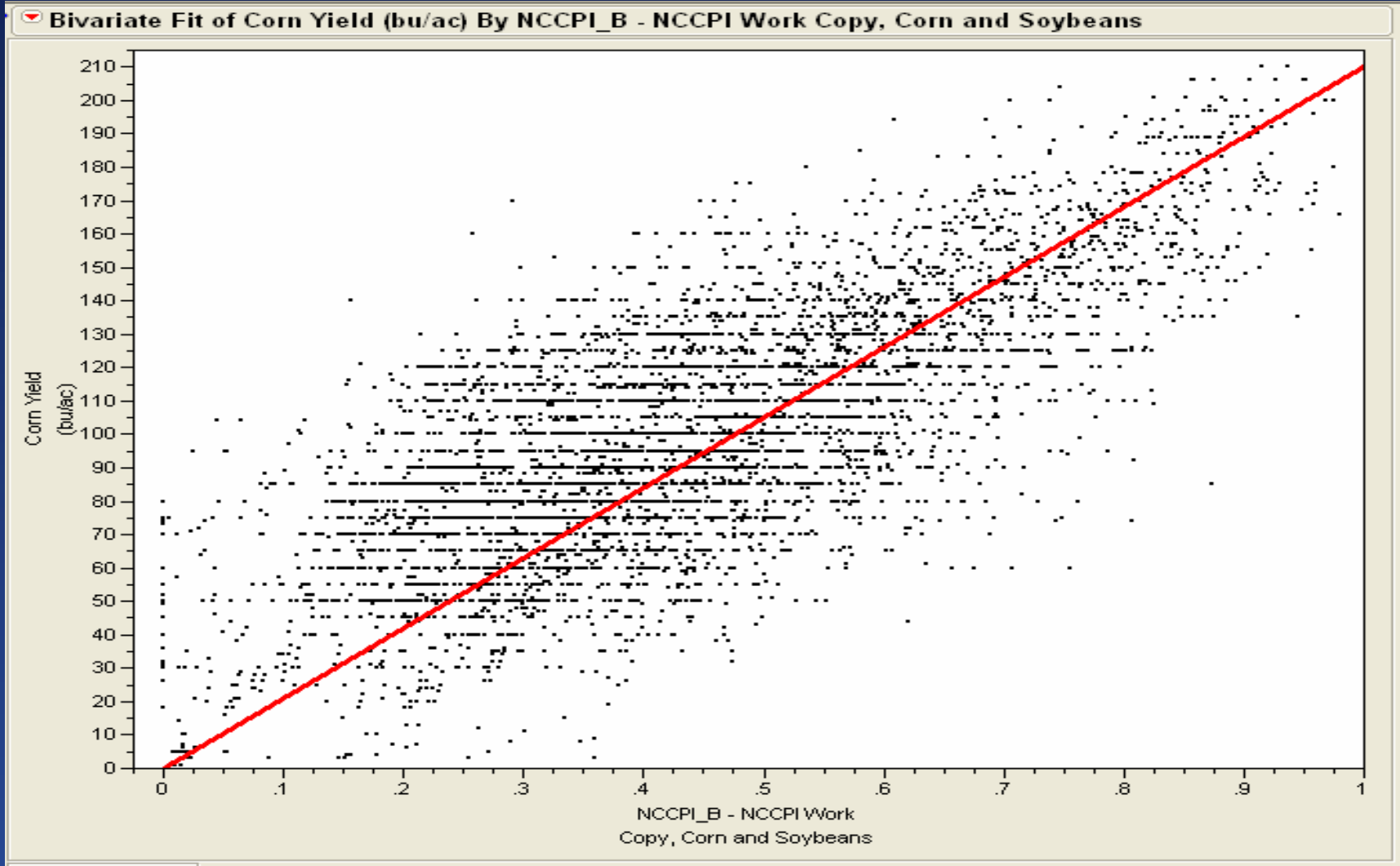


Cotton Subrule



National Commodity Crop Productivity Index Main Rule

Test NCCPI Versus Yield



Field Test

- Responses from 35 states
- Many suggestions incorporated into the model
- Also have maps to examine to evaluate the model

Data Used by NCCPI – Physical

- Root Zone Available Water Holding Capacity
- Bulk Density
- Saturated Hydraulic Conductivity
- LEP (Shrink-Swell)
- Rock Fragment Content
- Rooting Depth
- Sand, Silt, and Clay Percentages

Data Used by NCCPI – Chemical

- Cation Exchange Capacity
- pH
- Organic Matter Content
- Sodium Adsorption Ratio
- Gypsum Content
- Electrical Conductivity

Data Used by NCCPI – Landscape

- Slope Gradient and Shape
- Ponding Frequency, Duration, and Timing
- Flooding Frequency, Duration, and Timing
- Water Table Depth, Duration, and Timing
- Erosion
- Surface Stones
- Rock Outcrop

Data Used by NCCPI – Climate

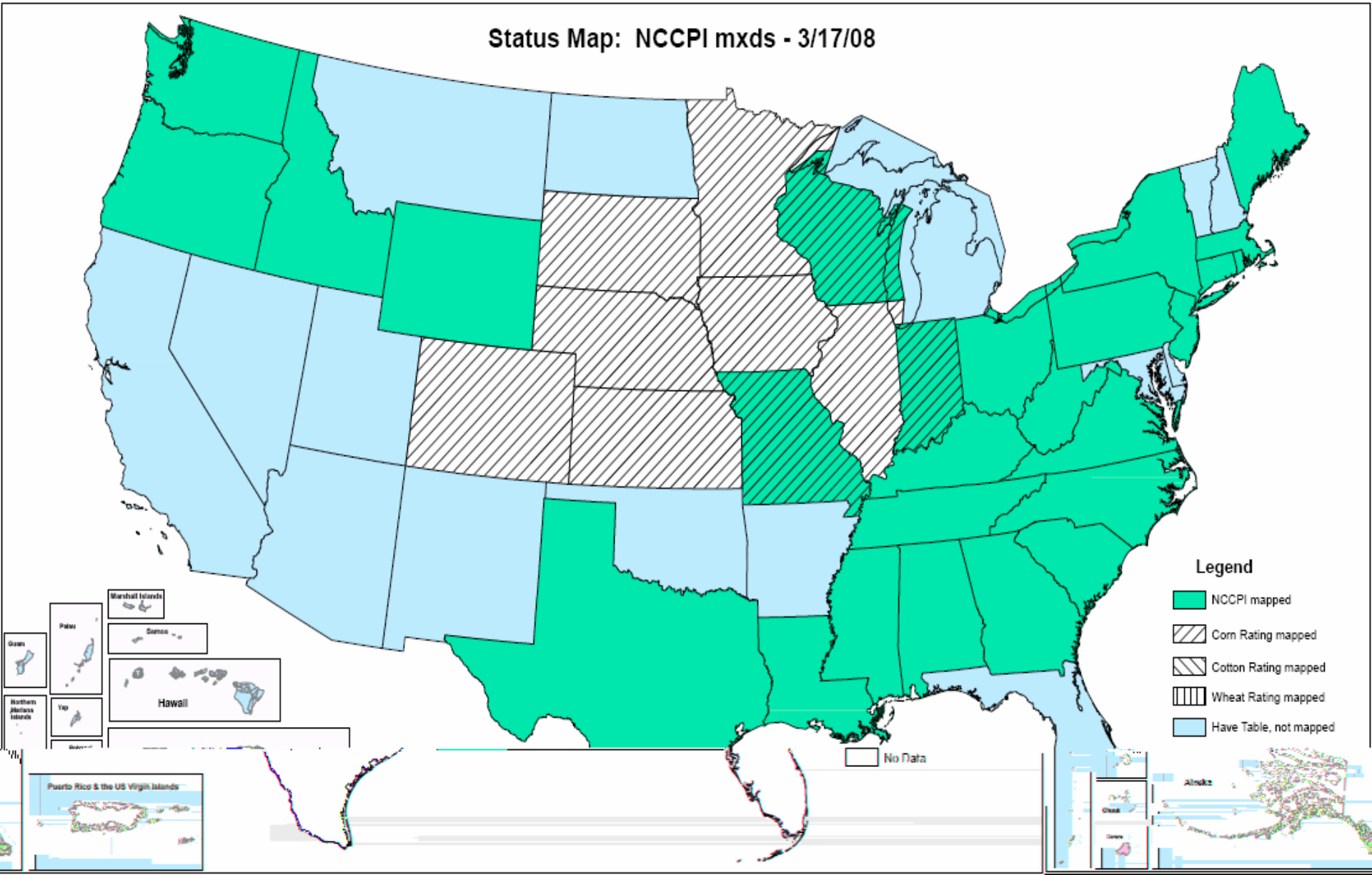
- Mean Annual Precipitation
- Mean Annual Air Temperature
- Frost Free Days
- Major Land Resource Area
- Soil Temperature Regime (Soil Taxonomy)

NCCPI Products

- Main product is the array of the soils
- A yield can be derived from the index if a given level of management is assumed
- Results can be aggregated over map units and linked to SSURGO spatial data for mapping, some maps available, index is available for most of USA
- Since the relation of yield to properties is known, we can estimate the impact of a change (better or worse) in the modeled variables
- Useful for dynamic soil properties and soil quality

What is Next?

- Refining the balance between the effects of properties
- Refining the indexing of scores between crops
- Building a report structure to allow selection of irrigated or non-irrigated crop systems
- Adding crop modules as needed
- If a state makes substantial changes to a soil survey area database, the index may change, we can re-run


Status Map: NCCPI mxds - 3/17/08
Legend
NCCPI mapped
Corn Rating mapped
Cotton Rating mapped
Wheat Rating mapped
Have Table, not mapped
No Data
Hawaii
Puerto Rico & the US Virgin Islands